PATENT SPECIFICATION

DRAWINGS ATTACHED

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889,758

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International Classification:—G21.

COMPLETE SPECIFICATION

Improvements relating to Nuclear Reactors

We, THE ENGLISH ELECTRIC COMPANY LIMITED, of Queens House, 28, Kingsway, London, W.C.2, and BABCOCK & WILCOX LIMITED, of Babcock House, 209/225 Euston Road, London, N.W.1, both British Companies, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to nuclear reactors of the kind including a core structure mounted on a support grid within a pressure vessel in turn surrounded by a biological shield, the support grid being supported from foundations through support means extending through, and supporting, the pressure vessel.

According to the present invention, in such a reactor means are provided for transmitting lateral shock loads from the biological shield to the support grid, said means being further arranged to permit relative radial expansion and contraction between the pressure vessel and both the support grid and the biological shield.

Lateral shock loads may arise, for example, in cases where the reactor is situated in a country subject to earthquake conditions, or in a moving body such as a ship.

According to a preferred feature of the invention, said means comprise a plurality of radially-extending sliding key and keyway means spaced angularly around the pressure vessel and arranged to inter-connect the pressure vessel both with the biological shield and with the support grid.

Further preferred features of the invention will appear from the following description with reference to the drawings accompanying the Provisional Specification in which Figs. 1 and 2 show respectively a sectional elevation and a sectional part plan of the relevant parts of a gas-cooled graphite-moderated nuclear reactor embodying a preferred arrangement according to the invention for use in a country subject to earthquake conditions.

Referring now to the drawings, the graphite core structure, generally indicated at 10, is mounted within a pressure vessel 11 on a support grid 12 which is in turn supported from the reactor foundations 13 through a cylindrical skirt 14, which also supports the pressure vessel.

The support grid is provided with rigid radial key members 15, spaced around its periphery, which project from a heavy ring member 16 forming part of the support grid. Each key member is arranged to slide between opposed bearing pads 17 mounted on the inside of pockets 18 formed in the pressure vessel 11. Further bearing pads 19 on the outside of these pockets are arranged to slide between opposed faces of U-shaped guide members 20 on the inside of the biological shield 21.

From the foregoing it will be clear that lateral shock loads due, for example, to earthquake conditions, will be transmitted from the biological shield through the pressure vessel to the top of the support grid. On the other hand relative radial movement between any point of the support grid around its periphery and the pressure vessel, or between the pressure vessel and the biological shield, will be freely permitted.

To reduce to a minimum the share of the shock load carried by the cylindrical skirt 14, the clearances between the bearing pads 17 and 19 and the key and guide members 15 and 20 respectively should be as small as practically possible.

WHAT WE CLAIM IS:—

1. A nuclear reactor of the kind including a core structure mounted on a support grid within a pressure vessel in turn surrounded by a biological shield, the support grid being supported from foundations through support means extending through, and supporting, the

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pressure vessel, wherein means are provided for transmitting lateral shock loads from the biological shield to the support grid, said means being further arranged to permit relative radial expansion and contraction between the pressure vessel and both the support grid and the biological shield.

2. A nuclear reactor according to Claim 1, wherein said means comprise a plurality of radially-extending sliding key and keyway means spaced angularly around the pressure vessel and arranged to inter-connect the pressure vessel both with the biological shield and with the periphery of the support grid.

3. A nuclear reactor according to Claim 2, wherein the pressure vessel is inter-connected with the biological shield through radially disposed key members rigid with the pressure vessel, each key member being arranged to slide between opposed guide faces rigid with the biological shield, and with the support grid through radially disposed key members rigid with the support grid, each of these key members being arranged to slide between opposed guide faces rigid with the pressure vessel.

4. A nuclear reactor according to Claim 3, wherein the key members rigid with the pressure vessel comprise outwardly projecting flat sided pockets formed in the pressure vessel, the guide faces engaged by the key members rigid with the support grid being formed on the insides of these pockets.

5. A nuclear reactor substantially as described with reference to the drawings accompanying the Provisional Specification.

F. A. WEBSTER,
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PROVISIONAL SPECIFICATION

Improvements relating to Nuclear Reactors

We, THE ENGLISH ELECTRIC COMPANY LIMITED, of Queens House, 28, Kingsway, London, W.C.2, a British Company, and BABCOCK & WILCOX LIMITED, of Babcock House, 209/225, Euston Road, London, N.W.1, a British Company, do hereby declare this invention to be described in the following statement:—

This invention relates to nuclear reactors of the kind including a core structure mounted on a support grid within a pressure vessel, the support grid being in turn supported from the reactor foundations through support means extending through the pressure vessel, and the pressure vessel being enclosed within a biological shield.

One object of the invention is to provide an improved form of nuclear reactor of this kind which is better able to withstand earthquake conditions.

According to one feature of the invention, in such a reactor means are provided for transmitting lateral shock loads from the biological shield through the pressure vessel to the support grid at a plane approximately in alignment with the upper part of the support grid.

According to another feature of the invention, the pressure vessel is coupled both to the biological shield and to the support grid through external and internal radially disposed sliding key means respectively, spaced angularly around the pressure vessel.

Further features of the invention will appear from the following description with reference to the accompanying drawings which show, by way of example, a nuclear reactor embodying one arrangement according to the invention. Fig. 1 is a sectional elevation through the reactor, whilst Fig. 2 is a part sectional plan.

Referring now to the drawing, the core structure, generally indicated at 10, is mounted within a pressure vessel 11 on a support grid 12 which is in turn supported from the reactor foundations 13 through a cylindrical skirt 14, part of which is inside the pressure vessel, and the remainder of which is outside the pressure vessel.

The support grid is provided with radial key members 15, spaced around its periphery, which project from a heavy ring member 16 forming part of the support grid. Each key member is arranged to slide between opposed bearing pads 17 mounted on the inside of pockets 18 formed in the pressure vessel 11. Further bearing pads 19 on the outside of these pockets are arranged to slide between opposed faces of U-shaped guide members 20 on the inside of the biological shield 21.

From the foregoing it will be clear that lateral shock loads will be transmitted from the biological shield through the pressure vessel to the top of the support grid. On the other hand relative radial movement between any point of the support grid around its periphery and the pressure vessel, or between the pressure vessel and the biological shield, will be freely permitted.

To reduce to a minimum the share of the shock load carried by the cylindrical skirt 14, the clearances between the bearing pads 17 and 19 and the key members 15 and 20 should be as small as practically possible.

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Agent for the Applicants.

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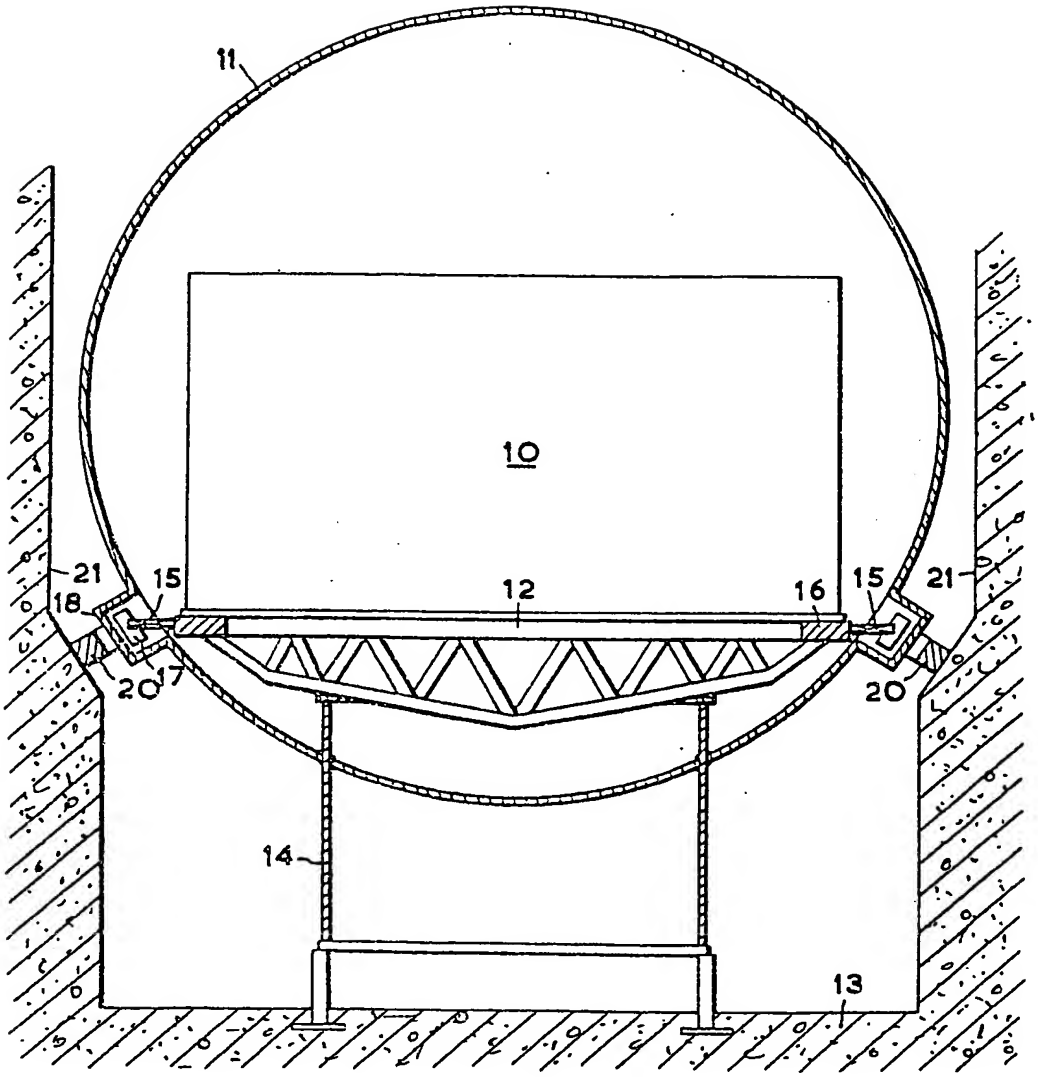

FIG. 1

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2 SHEETS

PROVISIONAL SPECIFICATION

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SHEETS 1 & 2

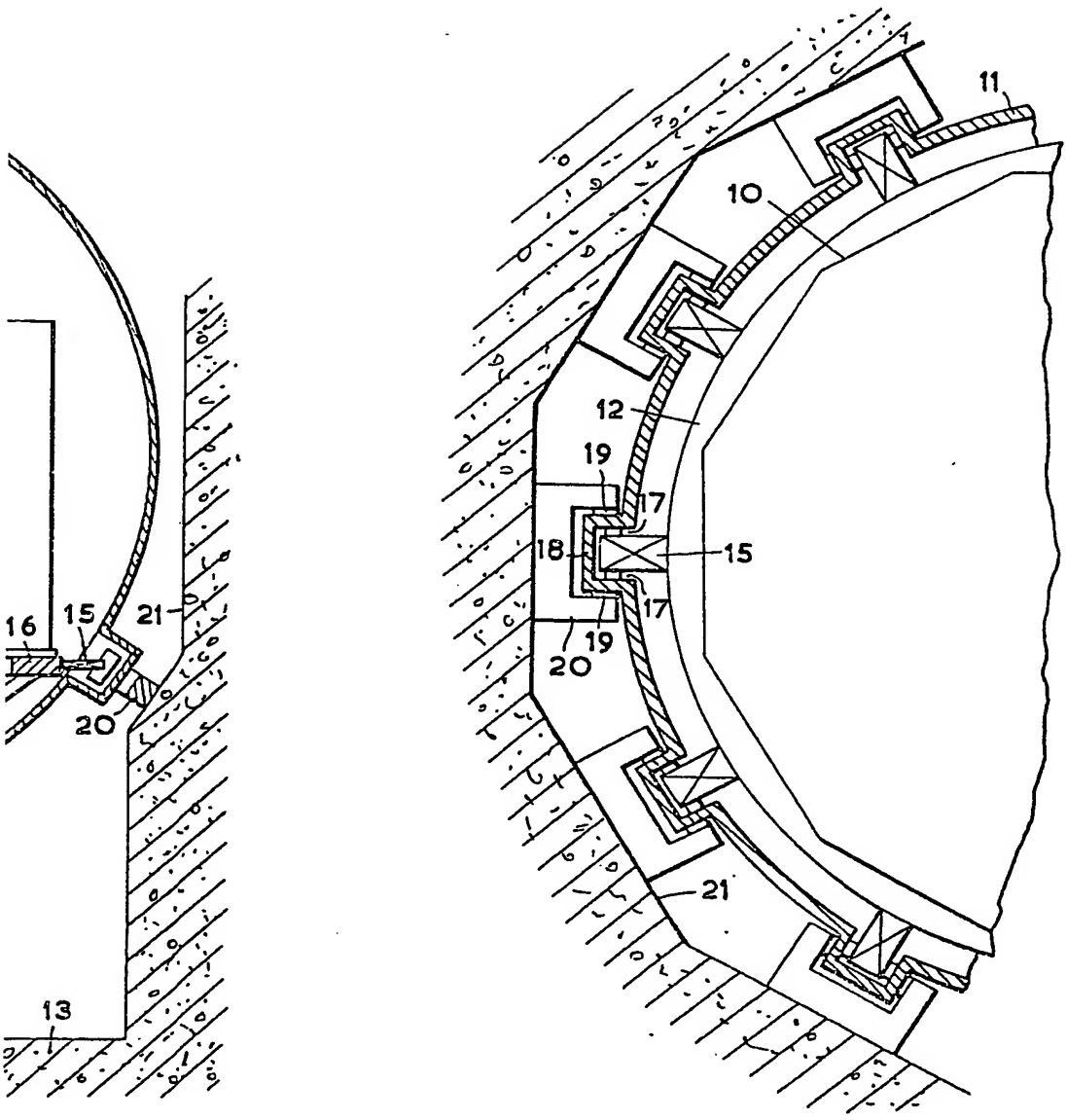

FIG. 2

889,758 PROVISIONAL SPECIFICATION
2 SHEETS
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SHEETS 1 & 2

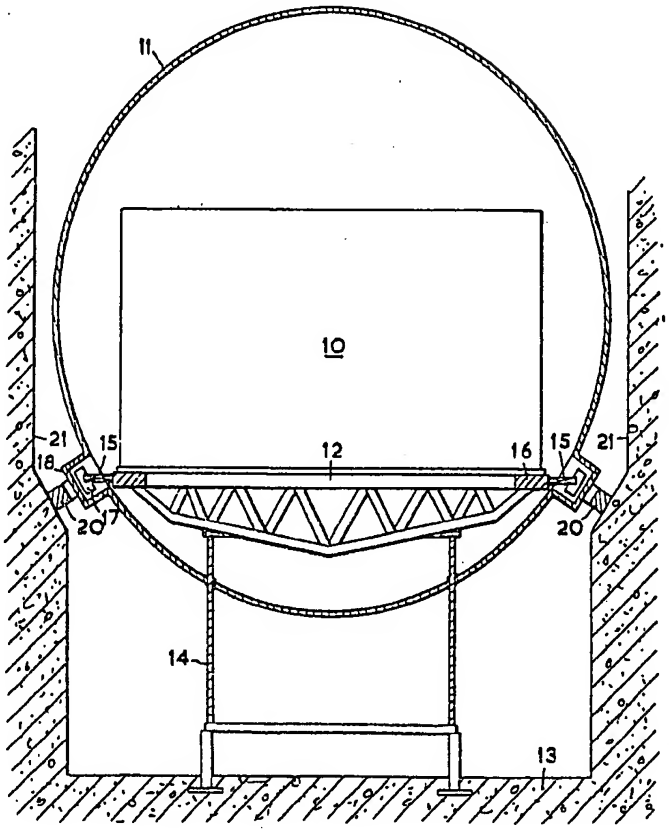

FIG. 1

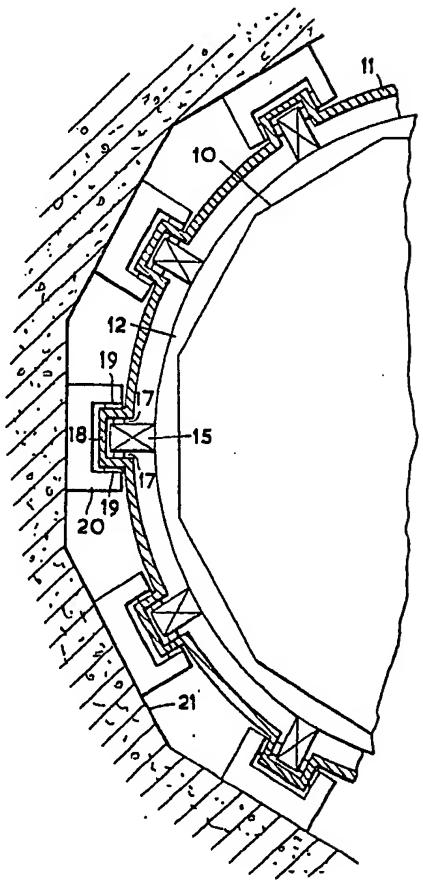

FIG. 2